

UNIT TESTS IN SCIENCE (BIOLOGY) FOR CLASS IX

J. P. AGARWAL
Reader



**Department of Measurement, Evaluation, Survey & Data Processing
National Council of Educational Research and Training**

Sri Aurobindo Marg, New Delhi-110016

1991

FOREWORD

The importance of organisation of the course content of a subject in an academic year into relatively independent and meaningful units, can hardly be over-stressed. But the organisation of instruction on these lines would be incomplete if it is not followed by a systematic planning of the evaluation of learning of the pupils. The methodology of testing the achievement of pupils in units has a definite place in the above scheme.

The present monograph 'Unit Tests in Science Part II for Class IX' comprising, detailed guidelines for preparing and using unit tests is an attempt in the aforesaid direction. The unit tests included in this monograph exemplify the methodology of evaluation that may be followed in the schools.

I wish to put on record my appreciation of the effort made by Shri J.I. Agarwal, member in bringing this monograph to light.

New Delhi
April 3, 1991.

P R E F A C E

Unit approach in teaching and testing is the most promising technique to integrate the process of evaluation with teaching and learning. This promotes better learning, develops regular study habits and discourages selected study. Integrating evaluation with teaching-learning process, it improves instruction as well as ensures pupils' steady progress. Thus, Unit approach in teaching and testing employs evaluation as formative, continuous and effective process for improved instruction as well as pupil's achievement.

The material was developed primarily in the workshop organised for the "Development of Unit tests in Biology for Class IX" from October 20, 1985 to October 24, 1986 at NIE Campus, New Delhi-16. After the publication of the new text-book in science by the N.C.E.R.T., this material was reviewed and updated according to the Text Book published by the National Council of Educational Research and Training, New Delhi (Science-A Text-book for Class IX, Part II, NCERT Publication, 1988) during the workshop organised from March 7-14, 1989 at K.D.S. College, Agra (U.P.).

The brochure includes unit tests on five units of the current science syllabus. Detailed guidelines have also been included to acquaint teachers with the technique of preparing unit tests including the preparation of design, blue-print, scoring-key and marking scheme, and editing and moderation of Unit Tests.

It is hoped that this material would serve the following objectives:

1. The teacher recognises the need and importance of using unit approach in teaching and testing.
2. The teacher acquires requisite know-how and expertise in developing appropriate unit test.
3. The teacher prepares the design and the blue print for developing a test-paper.
4. The teacher prepares scoring-key and marking scheme along with the unit test.
5. The teacher develops the habit of editing and moderating the test papers.
6. The teacher prepares appropriate unit tests.
7. The teacher employs unit test at the end of each unit for recording their pupils' progress.
8. The teacher uses the results of Unit Tests in diagnosing pupil strengths and weaknesses and offers feed-back to promote better learning.
9. The teacher employs unit tests for revealing the effectiveness of the teaching learning programme and improves it accordingly.
10. The teacher makes tests as effective tool of continuous and formative evaluation.
11. The teacher prepares and uses balanced test papers for summative evaluation.
12. The pupil uses the unit tests to reveal their level of performance.
13. The pupil acquires know-how about the process of scoring the answers and thus, knows how to attempt questions appropriately.

I am confident that the teachers would make an effective use of these unit tests and prepare more tests on similar lines to make teaching of science more effective and purposeful.

A number of subject experts and educationists including the practising teachers have participated in the two workshops for developing these unit tests. I am grateful to them for their significant contribution.

I owe my sense of gratitude to Dr.P.M. Patel, Head, Department of Measurement, Evaluation, Survey and Data Processing, D.C.E.S.D., New Delhi for bringing out this hand-book and for his valuable suggestions given time to time.

I also express my sincere thanks to Smt. Nar Bhagwan, Section Officer, DME&DE for providing all possible facilities. I am also thankful to Smt. Jag Mohan Kapoor, A.P.O. and Smt. Ramesh Chandra, Assistant for assisting me in the smooth conduct of the workshop. I will also like to thank Mr.D.S. Mandral, Mrs. Mridula Gupta and Mrs. Shobha Devi, LDCs of the department for typing the material to bring this monograph in the present form.

I hope the teachers and teacher-educators would make use of this material in implementing the measures of examination reform, specially, in integrating testing with teaching.

Comments and suggestions from teachers, teacher-educators and others for further improvement of the monograph would be most welcome.

New Delhi
January 9, 1991

J.P. AGARWAL
READER
DME&DP, NCERT
NEW DELHI-110016

UNIT TESTS IN SCIENCE(PART-II)FOR CLASS IX

Foreword

Preface

Page No.

Chapter I	Guidelines for Preparing and Using Unit Tests.	1
	1. Rationale	
	2. Unit Approach for Teaching and Testing.	
	3. Role of Unit Testing.	
	4. Preparation of a Unit Test.	
	5. Administration and Scoring.	
	6. Development of a Unit Test Library.	
	7. Guidance for using the Sample Unit Tests.	
Chapter II	Unit I : Habitat and organism	31
Chapter III	Unit II: A study of birds	44
Chapter IV	Unit III: Organisation in the living world.	54
Chapter V	Unit IV : Life Processes - I	64
Chapter VI	Unit V : Life Processes - II	74
<u>APPENDIX -A</u>	: A list of Instructional Objectives of Biological Science.	
<u>APPENDIX-B</u>	: Bibliography.	

I.

GUIDELINES FOR PREPARING AND USING UNIT TESTS

1.0 RATIONALE

Unit-wise Testing is a technique envisaged to bring quality improvement in classroom instruction since it demands to organise teaching unit-wise, ascertain pupils' learning at a rate commensurate with their ability, and assess effectiveness of teaching learning process. All these three aspects are part and parcel of the instructional programme concerned with continuous academic growth of the pupil. A good teacher organises his teaching programme step by step and finds out whether a minimum essential level of learning has taken place before embarking upon the next unit. This helps him in identifying student's strengths and weaknesses for remediation (curative diagnosis) as well as strong and weak points in his instructional programme for improvement (preventive diagnosis). Thus, he employs unit tests as a quality control system functional for both teaching and learning.

Most teachers have received little training, if any, in the techniques of preparing and administering unit tests. Prospective school teachers occasionally obtain a fleeting glance at tests and measurements during the pre-service training courses. Even then, however, the course is usually concerned with theoretical know-how of various techniques and tools of measurement and certain

descriptive statistical techniques. There is little or no time spent on teaching them how to develop and use evaluation instruments for their own specific needs. Consequently, they are not equipped well with the skill in preparing and administering unit tests. Thus, there is a woeful need for programmes to train teachers in the art of the unit testing. In this context, it is purposeful to provide adequate guidelines and sample unit tests so that teachers may acquire appropriate know-how in preparing and using unit tests.

2.0 UNIT APPROACH IN TEACHING AND TESTING

The 'Unit-wise teaching' is the first requirement for employing unit testing. This involves organisation of course content into meaningful units, preparation of unit plans including techniques of evaluation, organising instruction to the pupils, preparing and administering unit tests at the end of teaching every unit, and analysis of results to improve teaching as well as pupils' performance.

2.1 CONCEPT OF UNIT AND UNIT ORGANISATION:

A 'unit of study' is usually defined as a comprehensive and significant aspect of learning. It involves a closely related subject matter representing a central theme, a big idea, a major concept, or a broad generalization. Thus, it is not merely a block of subject matter or a series

of independent lessons. Besides interrelatedness of subject matter, a unit of study should be handy to introduce and also to review quickly, both by the teacher and his/her pupils. In general, it should be completed within a 2-weeks' work following the usual time-scheduled of the school. In this way, one year's course in a subject may be organised within 15-20 units of study. However, the number and size of these units of study may vary subject to subject and stage to stage depending upon the maturation level of pupils and the depth of study.

Present day syllabuses and text books, usually present the subject matter organised under units. The present text-book of Science for Class IX developed and published by the National Council of Educational Research and Training, New Delhi in 1988 has the subject matter organised under 21 Chapters, devoting seven Chapters for biological science, i.e., from chapter 15 to 21. These chapters may be accepted as seven units of study with minor modification in their nomenclature as suggested below.

UNIT ORGANISATION IN BIOLOGY (SCIENCE PART-II)

- Unit 1 : Habitats and Organisms (Chapter 15)
- Unit 2 : Study of Birds (Chapter 16)
- Unit 3 : Organisation in the Living World (Chapter 17)
- Unit 4 : Nutritional Metabolism (Chapter 18)
- Unit 5 : Reproduction, Control and Coordination (Chapter 19).
- Unit 6 : Human Beings (Chapter 20)
- Unit 7 : Science, Technology and Man (Chapter 21)

Where such a unit organization does not exist, the teacher organises the subject matter under suitable units and also gives an appropriate title to each unit reflecting the major concept, the broad generalization, the central theme, or the big idea involved in it.

2.2 PREPARATION OF UNIT PLANS INCLUDING TECHNIQUES OF EVALUATION:

The teacher chooses his own format and style of a 'unit plan' but it invariably includes content organisation into sub-units along with content analysis, Long-term and short-term instructional objectives, teaching-learning experiences and /or major teacher-pupil activities, unit introduction and review. An inclusion of instructional aids, assignments, projects and suggested readings facilitates better learning of pupils. A 'Unit Test' is also

planned to be administered at the end of the unit. Other techniques and tools of pupil assessment, such as, oral tests, performance tests for evaluating development of skills, Observation, interviews, check lists, inventories, rating scales, sociograms, etc. may also be employed depending upon the need to assess a pupil's attainment in cognitive, psychomotor and affective domains.

The content of a unit may be organised into 4-7 sub-units. Each sub-unit may be analysed for locating significant terms, facts, methods and procedures, events, processes, sequences, concepts, principles, theories, generalizations and big ideas. These are the major content-elements and due significance is to be given to them during the teaching learning programme. On the basis of content analysis and general educational goals, the list of unit Objectives, both long-term and short-term objectives is prepared. The short-term Objectives must be stated in terms of behavioural outcomes which should be terminal, worthwhile, measurable, attainable, challenging and realistic. Each specific objective (or short-term Objective) is written as a full sentence involving the behaviour and the content. A list of instructional objectives is provided in Appendix-A.

The teaching-learning experiences and the teacher-pupil activities are then planned in the light of the pre-determined instructional Objectives. Selection of appropriate teaching aids should be made to increase effectiveness of the instructional programme. Inclusion of home assignments and suggested readings promotes further learning. Techniques of evaluation may also be specified in detail. However, a unit test must invariably be included.

2.3 ORGANISATION OF CLASSROOM INSTRUCTION:

The teacher organises teaching-learning activities according to the unit plan and subsequent lesson plans. He is supposed to adhere to his teaching plan but must modify it intelligently if the Classroom situation warrants. Use of teaching aids and appropriate teacher-Pupil activities offer sufficient teacher-pupil interaction and pupil to pupil interaction making Classroom conducive to learning. In such situations both learning and relation is maximum.

3.0 ROLE OF UNIT TESTING IN TEACHING AND TESTING

Unit tests provide useful information about the pupil achievements, primarily, in the cognitive domain, i.e. Knowledge, Understanding and Application, and to some extent in the psychomotor domain, i.e. the drawing

skills. If this data is used appropriately, the strengths and weaknesses of pupils can be diagnosed for remediation as well as the effectiveness of teaching programme can be assessed to bring improvement in education. Moreover, it emphasizes a shift in teachers' attention from examination-oriented teaching to objective based instruction. This makes testing as an integral part of the teaching-learning process and enforces qualitative improvement in education. Thus, its major role is to provide a quality-control mechanism to maintain high standards of education by making evaluation formative, continuous, diagnostic and informal.

3.1 CHARACTERISTICS OF A UNIT TEST:

A unit test is pedagogically different from periodical tests and terminal examinations. The following characteristics make this point of view explicit:

1. It is designed and developed on a small block of content instead of on a large junk of subject matter. Thus, it samples subject areas belonging to a unit of study only.
2. It is an informal test as pupils are not informed in advance to make formal preparations for appearing in this test.
3. It is administered immediately after the termination of teaching-learning activities without leaving any scope for extra preparation on the part of the pupils for this test.

4. It does not intend to create fear and tension among the young learners.
5. It is diagnostic in nature as it reveals strengths and weaknesses of pupils as well as of the instructional programme.
6. It is formative in effect as it provides opportunities to promote better learning as well as to improve instruction by means of regular feed-back.
7. It is teacher-based test and thus, offers greater flexibility regarding techniques and tools to be employed for testing. Usually, it is confined to employ the tools used by public examinations, but can use other devices like oral tests, Observation, rating scales, inventories, checklists, etc. to cover all aspects of pupil growth intended.
8. It can be used by the pupils as a self-evaluating device. If the test paper is given to them to try it on themselves, they can first attempt the questions and then score their responses with the help of scoring-key and marking-scheme, if provided. This would develop confidence in pupils and may discourage them to use mal practices at examination.

Thus, a unit test can be characterised as a informal, diagnostic, formative, teacher-based and flexible device of evaluation. It is different from the public examination as the latter offers formal, normative, summative, external and fixed form or device for testing pupils.

3.2 USES OF UNIT TESTS:

Unit tests when administered regularly after having arranged the instructional programme of the unit, they

serve the following purposes:-

1. determines the extent to which the objectives of the unit of study have been realised;
2. provides up-to-date measures of pupil achievement frequently, thus making assessment almost continuous;
3. identifies pupils' strengths and weaknesses which helps in stimulating pupils for steady progress and making up deficiencies, if any;
4. offers evidence whether or not a particular ability has been mastered by an individual;
5. makes students regular at studies, discouraging selected study often made by the close of the academic year;
6. provides useful information to make teaching more effective through reformulation of objectives and modification of teaching which brings quality improvement in instruction.

The unit tests can also be used as 'Periodical-tests' for gathering data for promoting pupils to the next higher class as well as for discriminating among students on the basis of their various levels of achievement (= Comparison and classification of pupils). For this purpose, the unit tests are administered as formal tests, and the pupils are informed, in advance, to make necessary preparations.

4.0 PREPARATION OF A UNIT TEST

A test paper is not just a random assortment of questions but rather a meaningful assembly of questions

organised on the basis of a pre-determined plan of specifications. In fact, it comprises of five basic components, i.e., the design, the blue print, the test paper, the scoring-key and marking-scheme, and the question-wise analysis. A test-writer usually prepares all of these five components in order to have a valid, reliable and balanced tool of assessment. The following steps would be necessary to prepare a good and balanced unit test:

1. Preparation of a design,
2. Preparation of a blue print,
3. Constructions of Questions,
4. Preparation of Scoring-key and Marking-scheme,
5. Editing the test paper,
6. Moderation of the test.

It would be purposeful to acquire the requisite know-how and expertise in preparing the test following the above mentioned steps.

4.1 PREPARATION OF A DESIGN:

Design is the basic lay-out or pattern of a test-paper evolved on the basis of six important policy decision, i.e., weightages to instructional objectives, weightages to forms of questions, weightages to content sub-units, weightages to difficulty level of questions,

scheme of options and scheme of sections. This means that the test-writer should first take these policy decisions in the light of the instructional objectives, content sub-units, teaching-learning activities and maturation level of pupils. A proforma for recording these policy statements is provided in Appendix B.

4.1.1 Weightages to Objectives:

The test planner decides about the relative weightages to be given to different instructional objectives, such as, Knowledge, Understanding, Application, Skill, etc. These weightages are given in terms of percentages of marks keeping in view the relative emphasis given to them during the actual class-room instruction. Later on, convert them into actual marks rounding them to the nearest whole number (Refer Table No.1). Appropriate weightages to objectives help in developing a realistic and valid pattern of the test paper.

4.1.2 Weightages to Forms of Questions:

The test paper should have a fairly large number of questions to acquire acceptable test reliability and validity. Inclusion of very short-answer and objective questions help increase the objectivity and reliability. The appropriate weightages ~~should~~ be given in terms of

percentage of marks to different forms of questions considering the length of test paper, time allocation for the test, and coverage and scope of the content of the unit. Sometimes, a test planner may decide to have objective and/or very short-answer questions only. Such a test-paper is expected to have better objectivity, reliability and validity.

While deciding weightages to different forms of questions, allocation of marks for each type of question, approximate length of their intended answers, and estimated time for attempting them should also be decided. The marks to each form of question should always be in whole numbers. In general, it is recommended to allocate 1 mark each for very short-answer and objective questions involving only one value point and expected to be attempted within a minute. The short answer question may be allotted 2 marks each, involving 2-4 value points, requiring an answer of 20-40 words and time allocation of about 3-5 minutes. On the other hand, a long answer (essay) question may be allotted 4 marks, requiring an answer of 50-100 words (without a diagram) and time-allocation of about 9-12 minutes. These recommendations are found suitable for class IX in Science. A sample distribution of marks over various forms of questions, i.e. weightages to Forms of Questions is given at Serial 2 in Table 1.

TABLE 1 : A SAMPLE OF A DESIGN FOR UNIT TEST

Subject : Science Part II (Biology)
 Unit IV : Organisation in the Living World
 Class : IX
 Time : 30 mts.
 Marks : 20

1. Weightage to Objectives:

Objectives	K	U	A	S	Total
Percentage of marks	40	40	10	10	100
Marks	8	8	2	2	20

2. Weightage to Form of Questions:

Forms of Questions	LA	SA	VSA	O	Total
No. of Questions	1	3	5	5	14
Marks Allotted	4	6	5	5	20
Estimated Time	10 mts.	10 mts.	5 mts.	5 mts.	30 mts.

3. Weightage to Content:

Sub-Unit	Percentage of marks	Marks
SU-1 Levels of Organisation	10%	4
SU-2 Cell Structure	15%	6
SU-3 Mitotic Cell Division	10%	3
SU-4 Meiotic Cell Division	25%	4
SU-5 Crossing Over	15%	3
Total	100	20

4. Difficulty level: A: 30%, B: 50%, C: 20%

5. Scheme of Sections : Nil

6. Scheme of Options : Nil

Abbreviations: K (Knowledge), U (Understanding), A (Application), S (Skill), LA (Long Answer), SA (Short Answer), VSA (Very Short Answer), O (Objective), A (Difficult), B (Average), C (Easy)

4.1.3 Weightages to Content sub-units:

Usually a unit comprises 4-7 sub-units. Each sub-unit is allotted appropriate weightage in terms of marks (or percentage of marks) visualizing its relative significance, number of concepts involved, and the time devoted to teaching it. In general, no sub-unit is devoted less than 10% marks and more than 35% marks. However, there may be some exceptions depending upon the number of sub-units. It should be remembered that the sub-unit from which essay question is to be set should get atleast 20% weightage (See Table 1 at Serial 3).

4.1.4 Weightages to Difficulty Level of Questions:

Difficulty level of a question is defined as the percentage of examinees attempting it wrongly. In general, a question is considered difficult if it is attempted wrongly by more than 65% pupils. Similarly, a question is classified as an easy question when attempted wrongly by less than 35% of the examinees. An average question is attempted wrongly by 35-65% examinees. This index of item difficulty can be known statistically only after having administered the test. But even at the time of setting a question, the item-writer can estimate approximately what percentage of

my pupils would be able to answer it correctly. Reverse of it is the estimated difficulty level. For a unit test in science, it would be appropriate to include in general, about 25% easy, 50% average, and 25% difficult questions.

4.1.5 Scheme of Options:

Since a unit test is designed to diagnose strengths and weaknesses of pupils as well as of the instructional programme, and so, it must neither have overall options nor internal options. The options are useful in situations where the major emphasis is on testing abilities of organisation and expression of ideas instead of on knowledge of ideas.

4.1.6 Scheme of Sections

There is no need to have sections for a unit test since it is a test of only 30-35 minutes duration.

The design of a test paper develops the basic structure of the test paper in terms of above mentioned policy decisions. Sample designs are provided for each unit test included in this brochure. Teachers may also evolve their own designs on the lines outlined in the preceding paragraphs.

4.2 PREPARATION OF A BLUE PRINT:

Blue print is the operational lay-out of the design

for preparing a test paper. It is often described as a 3-dimensional chart because it depicts a tabular form the three dimensions of a question, i.e., Objective, Content, and form of question. In addition, the blue print also indicates the numerical weightage of each question. The following sequential steps would help teachers in preparing a good blue print. A proforma for this purpose is provided in Appendix B.

1. Transfer the policy decisions laid down in the design, i.e., weightages given to objectives, form of questions, content sub-units and difficulty level of questions. Scheme of options and scheme of sections, if any may also be transferred (Refer Table
2. Now, complete the cells under the sub-column under LA (or E). Suppose there is a provision of only one long-answer question, and you have decided to test understanding objective from the sub-unit 2 (SU-2), make the entry as 4(1) in the corresponding Cell. The figure within the bracket indicates the number of questions allocated to the Cell and the figure outside the Cell denotes marks allotted. Instead of this, suppose you desire to test drawing skill giving a weightage of 2 marks and description at

understanding level for 2 marks by a long-answer question from the sub-unit 2, place 2(1)* in the Cell made on the line of SU-2 in the sub-column LA under the column Understanding instead of 4(1), and also enter 2(-*) on the same line in the sub-column LA under skill (Refer Table 2). The aster(*) placed here denotes that marks have been combined to form one question.

3. After completing the placement of Long-answer questions, allocate positions to the questions to measure 'application' objectives in the same manner as stated for placing long-answer questions.
4. Now, allocate positions to remaining short-answer questions following the procedure stated for placement of long-answer questions. It would be better if you fill positions first to short-answer questions testing skill followed by questions testing understanding and knowledge.
5. The remaining vacancies may be completed by Very-short-answer and Objective question sub-unitwise according to your intentions. The allocation of marks to each line must not exceed the weightage allocated to it.

TABLE 2: A SAMPLE OF BLIND PAPER (ALCOHOLICITY SURVEY NUMBER OF QUESTIONS)

Sub-Units	KNOWLEDGE				UNDERSTANDING				APPLICATION				TOTAL
	LA	SA	VSA	O	LA	SA	VE	O	LA	SA	VE	O	
Sub - 1	- 2(1) 11	- 1(1) 1	-	-	- 1(1) 14	-	- 1(1) 8	-	-	-	-	-	4(3)
Sub - 2	-	- 1(1) 6	-	- 2(1) 14	-	-	-	-	- 1(1) 5	2(4) 5	-	-	6(3)
Sub - 3	-	-	- 1(1) 2	- 2(1) 13	-	-	-	-	-	-	-	-	3(2)
Sub - 4	- 2(1) 12	-	-	-	-	-	- 1(1) 3	-	-	- 1(1) 10	-	-	2(3)
Sub - 5	-	- 1(1) 7	-	-	-	- 1(1) 3	- 1(1) 4	-	-	-	-	-	3(3)
Sub Total	- 4(2)	- 2(2)	- 2(2)	- 2(1)	- 2(1)	- 2(2)	- 2(1)	-	- 1(1)	- 1(1)	- 2(4)	- 2(14)	
Total	3(6)				8(6)				2(3)				2(-)

NOTE: The figures with in a circle shown at the right hand bottom of the cell denotes the serial number of the question.

6. Complete the line of sub-totals and find out the number of questions placed for each form. If there is any discrepancy, which is expected only for 'VSA' and 'O' questions, overcome it by changing VSA to O or vice versa.
7. Complete the line of totals to get the marks allocated to objectives. The figures so obtained should tally with those allotted as weightages to objectives. There may be a discrepancy in the columns of knowledge and Understanding which can be overcome by transferring one or more 'VSA' and/or 'O' questions from knowledge of a sub-unit to understanding of the same sub-unit or vice versa.
8. After completing positions of the questions, allot them serial numbers. This task can easily be accomplished on the blue-print itself. For this purpose, locate the sub-column of 'O' under knowledge and allot serial number 1 to the question appearing first in it. On this basis Objective question testing knowledge of SU-1 gets Serial number 1 (Table 2). Now proceed downwards giving serial numbers 2,3, and so on. Continue this process for objective questions under Understanding and then under skill.

This process is continued in a similar fashion for VSA questions followed by SA and LA questions. In this way, all the questions get serial numbers.

4.3 CONSTRUCTION OF QUESTIONS:

Questions are constructed according to the specifications laid down in the Blue print. In fact, each question is defined in terms of its following dimensions:

1. the instructional objective to be tested,
2. the content sub-unit to be sampled,
3. the form of question to be employed,
4. the numerical weightage to be given,
5. the item difficulty of a question,
6. the approximate length of a question,
7. the approximate time required in attempting a question.

The questions are written on item-sheets, specially developed for this purpose (Appendix B). Only one question should be written on an item-sheet. First of all, enter the factual information about the question as laid down in the blue print and then start constructing the question. For framing a good question according to these dimensions, it requires practice and a good knowledge of instructional objectives and their specifications, mastery over the content and accurate know-how about various forms of

questions. The following guidelines would be useful for preparing appropriate questions for the unit test:-

1. Frame the question to test the Objective (and specification) as stated in the item-sheet.
2. Frame the question in such a way that it samples a significant and positive aspect of learning from the sub-unit mentioned in the item-sheet.
3. Use the form of question already specified in the itemsheet.
4. Write the question using a simple clear and unambiguous language, usually the pupils' language so that the task is communicated exactly without involving two interpretations.
5. Employ directional words appropriately, specifying the scope of the answer and the style of answering. The item difficulty is also set by it.
6. Construct the question pointing out a definite answer. Also prepared the model answer and/or the marking scheme which should tally with the expected answer.
7. The length of the answer should be so controlled that demands almost the same time already specified for attempting the question.
8. Fix the value points and marks which should be justifiable and tally to the stated specifications.
9. Frame the question in minimum number of words in order to avoid unnecessary reading load. There should be no superfluous information but it must communicate the task clearly and effectively.
10. The length of the answer demanded by the question should be well within the range decided for a particular form of question.

4.4 PREPARATION OF SCORING KEY AND MARKING SCHEME:

The correct answer of an objective question is termed 'key' and so its marking scheme is usually designated as 'scoring key'. Serial number or letter denoting the key should be recorded in the item-sheet at the space specified for this purpose. For all other forms of questions, i.e. very-short answer, completion type, short-answer and long-answer questions involving one or more value points, the answer is recorded value-point wise in the item-sheet allocating appropriate marks to each value-point. A sequence of value-points, so obtained, is often termed as marking scheme.

It is recommended to prepare the scoring-key and marking scheme of a question simultaneously, i.e. at the time of construing the question. It provides a check in rectifying mistakes, if any, either in the question or in the expected answer. Marking scheme, if needed, may be discussed with fellow subject teachers for further improvement.

Sometimes, a question may involve more number of value points than asked. In such cases, clear instructions should be given in the beginning of the marking scheme of the said question, i.e., any four out of the following (one mark each, total marks 4). It is also probable that there may be a correct value point, not included in the

marking scheme; for this, it would be better to mention in the end of answer "any other, one or more correct ones". This type of situation, usually, does not appear in unit testing as the teacher himself or herself is the evaluator.

4.5 EDITING THE TEST PAPER:

The editing of the test paper of a unit test involves assembling of questions according to the serial numbers allotted on the blue print, developing instructions to the examinees and providing directions for administration of the unit test, if any. In fact, questions are first assembled form of questionwise, and then, each form of question is arranged Objective-wise beginning the sequence from knowledge questions via Understanding and application to skill questions. After that questions are arranged sub-unit wise. This procedure for assembling the questions is found convenient, purposeful and effective.

Detailed instructions for examinees are usually prepared for question-papers but in the test paper of a unit test, these are not so necessary while preparing sample unit tests, the instructions have been provided in quite details so that pupils may become accustomed with them.

4.6 MODERATION OF THE TEST:

Moderation of the 1st paper of a unit test is not required by an external agency. But the teacher herself/himself may review the various components of the unit test in order to have a more balanced and purposeful test. She/he may discuss with her/his fellow teachers, if needed. She/he may review the design for adequate and appropriate allotment of weightages to the Objectives, the form of questions and the content sub-units in the light of blue print and the test paper. This review may reveal that allocation made to 'application Objectives' is too much as the unit could not yield good application questions, or that allocation made to 'Long-answer questions' is inappropriate as other form of questions test more appropriately, etc. Such difficulties may be overcome by having a review of the design.

Review of the blue print in the light of test paper construction may reveal that some of the allocations are not appropriate. There may be a sub-unit having an allocation of very short answer question testing application while that sub-unit is not found suitable for such a question. On the other hand there may be other sub-units more suitable for such questions but there

is no allocation. Such problems can be overcome by this type of review of the blue print.

A 'question-wise analysis' must be prepared analysing each question with reference to objective, specification, sub-unit of the content, form of question, allocation of marks, estimated time and difficulty level of questions. A format for this purpose is provided in Appendix B. Sometimes, a few additional dimensions are added to make this analysis more comprehensive, e.g., appropriateness of the languages of the question, correct use of directional words, suitability of the marking-scheme, etc. On the basis of question-wise analysis, each question can be checked to tally with the position allotted in the blue-print. If it does not, the question is to be modified. There is another alternative way to check these dimensions of a question from those allocated in the blue print. Take another proforma of the blue print and indicate the serial number of the first question in the cell where it can be placed most appropriately with respect to sub-unit, instructional objective and form of question. In this way, place all the questions one by one. If a question tallies exactly with the original blue-print, it means it is framed according to the directions of the blue print. If not, which questions? These questions are to be reframed.

The check-list provided in Table 3 would be useful in recording or reviewing strengths and weaknesses of a question and its marking scheme in order to bring necessary improvement in them. If it checks 'no', it means a weakness demanding improvement. If it checks 'yes', it shows appropriateness.

After reviewing individual questions and their marking schemes, they are improved accordingly. This makes the test paper better.

5.0 ADMINISTRATION AND SCORING:

The first task is to select a suitable layout for the test paper. The best layout is one which utilizes the space available while retaining readability. In most cases it is wise to avoid a layout which results in one line questions spanning an eight-inch-wide page. A two-column page may be the best layout for multiple choice questions. But, when a unit test comprises of various forms of questions, it becomes difficult to use a 2-column page. In general, it would be most convenient for a pupil of Class VII, if he gets a printed test paper of the dimension $5\frac{1}{2} \times 7\frac{1}{2}$ or so, having a line spanned not more than 4".

Most schools do not have sufficient funds for getting test papers of unit tests printed. They may not even have

TABLE 3: CHECKLIST FOR REVIEWING INDIVIDUAL QUESTIONS

Sl. No.	Item of the Checklist	Yes	No
1.	The question occupies the position as allotted by the blue print with respect to: (a) instructional objective (b) form of question (c) content sub-unit		
2.	The question is expected to be attempted within the time estimated.		
3.	The question makes use of the directional word appropriately.		
4.	The question specifies the task in a precise, simple clear and unambiguously worded language.		
5.	The question specifies the scope of the answer.		
6.	In case of a multiple-choice question: (a) All the distractors are plausible (b) There is only one correct answer (c) There is no irrelevant clue in the stem (d) The stem does not contain any irrelevant material.		
7.	The value-point-wise preparation of the marking scheme is appropriate.		
8.	There is no overlap between questions of the test paper.		
9.	The test paper can be attempted within the time allotted.		
10.	The weightage to the item difficulty is according to the design/blue print.		

adequate facilities to get the test paper typed or mimeographed. In such cases it is better to write the test paper legibly on the chalk board. However, the teacher may evolve a long-term plan to get sufficient hand written copies with the help of students for his future use. He may also use his resources to get sufficient copies mimeographed or photocopied.

The answer scripts should be immediately scored to get the data as quickly as possible. The data so obtained may be analysed with reference to appropriateness of individual questions, realization of instructional Objectives and progress of individual pupils. This would help diagnose strengths and weaknesses of pupils and so, appropriate remedial instructions would be offered to bring them to the minimum desired level. It would also aid in diagnosing the appropriateness of the instructional materials to bring improvement in quality of instruction.

6.0 DEVELOPMENT OF A UNIT TEST LIBRARY

Some of the problems associated with the preparation and getting the desired number of copies for administration of unit tests can be overcome if schools individually or collectively maintain a comprehensive pool of unit tests. Such a 'Unit Test Library' may be better located at the District Institutes of Education and Training (DIET). These institutes may organise inservice

programmes for orienting teachers in preparing and using unit tests. Pooling resources of the schools, class and subject-wise unit tests may be got prepared on every unit, and thus, a comprehensive pool of unit tests on each unit of study can be obtained. These may be got printed in sufficient number for distribution to individual teachers for their use. A system of regular feed-back must be maintained between the DIET and the school so that these unit tests may be refined and updated time to time.

7.0 GUIDANCE FOR USING THE SAMPLE UNIT TESTS

The sample unit tests have been developed in the light of new curriculum and instructional materials developed by the National Council of Educational Research and Training, New Delhi. It is expected that these tests will serve the following purposes:

1. The teachers may administer these tests to assess the effectiveness of his teaching-learning programme and improve accordingly the methods and materials for teaching, and thus would bring quality improvement in education.
2. The teachers may prepare their own unit tests on all units of study on similar lines and use them in their classes.

3. The teachers may analyse pupil results on each unit test to diagnose their strengths and weaknesses and offer remedial instruction suitably to overcome deficiencies and strengthen steady progress.
4. The teachers may also use these tests, after having incorporated certain changes, as achievement tests (unit wise) to have of depending upon one single examination at the end of the course.

Each unit test provided in this brochure, possesses all the five basic components, i.e., the design, the blue print, the test paper, the scoring-key and marking scheme, and the question-wise analysis. The teachers are expected to go through them in order to know the requisite instructional programme. The teaching should be organised accordingly and then, the test may be administered to get the desired fruits of teachers' efforts.

UNIT -1

HABITATS AND ORGANISMS

COMPONENTS OF THE UNIT TEST:

- (A) Design
- (B) Blue print
- (C) Test paper
- (D) Answer-sheet
- (E) Scoring key and Marking scheme
- (F) Question-wise Analysis

TEXT BOOK MATERIAL USED:

CHAPTER 15: WAYS OF LIVING: HABITATS -
Living Places and Organisms Science -
A Text book for Class IX (Part-II) N.C.E.R.T.
Publication, 1988.

(A) DESIGN OF THE UNIT TEST

Subject : Science (Biology)
 Unit : Habitats and Organisms
 Class : IX
 Time : 30 mts.
 Marks : 25

1. Weightage to Objectives:

Objectives	:	K	U	A	Total
Percentage of marks	:	40%	40%	20%	100%
Marks	:	10	10	5	25

2. Weightage to Form of Questions:

Forms of Questions:	TIF	MT	MPC	Total
No. of Questions	: 8	: 4	: 13	25
Marks allotted	: 8	: 4	: 13	25
Estimated Time	: 10mts.	: 5 mts.	: 10mts.	30mts.

3. Weightage to Content:

Sub-Unit Number	Sub-units	Marks
SU-1	The Habitat (Ch. 15.1, 15.2)	6
SU-2	Adaptation in Aquatic Organisms (Ch. 15.4, 15.5, 15.6)	4
SU-3	Adaptation in Terrestrial Organisms (Ch. 15.7, 15.8)	5
SU-4	Interdependence (Ch. 15.3)	3
SU-5	How do Adaptations Occur? (Ch. 15.9)	3
SU-6	Man Manipulates his Habitat (Ch. 15.10)	4
	Total	25

4. Difficulty level: Difficult (A) : 24% marks
 Average (B) : 52% marks
 Easy (C) : 24% marks

5. Scheme of Sections : NIL

6. Scheme of Options : NIL

Abbreviations: K (Knowledge), U (Understanding), A (Application), S (Skill); TIF (True-False), MT (Matching), MPC (Multiple choice).

(B) BLUE PRINT OF THE UNIT TEST

SUBJECT : SCIENCE (BIOLOGY)
UNIT : EXPLANTS AND ORGANISMS

CLASS: X
TIME : 30 Minutes
MARKS : 25

1
3
3
1

OBJECTIVES SUB-UNITS	KNOWLEDGE			UNDERSTANDING			APPLICATION			TOTAL
	T/F	MTC	MPC	T/F	MTC	MPC	T/F	MTC	MPC	
1. SU-1	-	-	1(1)	-	4(4)	1(1)	-	-	-	6(6)
2. SU-2	1(1)	-	1(1)	-	-	1(1)	-	-	1(1)	4(4)
3. SU-3	3(3)	-	-	-	-	1(1)	-	-	1(1)	5(5)
4. SU-4	-	-	1(1)	-	-	1(1)	-	-	1(1)	3(3)
5. SU-5	1(1)	-	-	1(1)	-	-	-	-	1(1)	3(3)
6. SU-6	1(1)	-	1(1)	1(1)	-	-	-	-	1(1)	4(4)
SUB TOTALS	6(6)	-	4(4)	2(2)	4(4)	4(4)	-	-	5(5)	
SUB TOTALS	10(10)			10(10)			5(5)			25(25)

Figure within brackets indicates number of questions and figure outside brackets indicates marks.

SUMMARY		DIFFICULTY LEVEL OF QUESTIONS	
TRUE - FALSE (T/F)	NO. 8		
MATCHING ITEM (MTC)	4		
MULTIPLE - CHOICE (MPC)	13		
TOTAL	25		

DIFFICULTY LEVEL OF QUESTIONS
Difficulty: 24%, Average: 52%, Easy 24%
SCHEME OF SECTIONS: III

(C) TEST PAPER OF THE UNIT TEST

SUBJECT : Science (Biology)
UNIT : Habitats and Organisms

Class : IX

Duration : 25

TIME : 30 min

INSTRUCTIONS:

1. There are twenty-five questions in all.
2. All questions are compulsory.
3. Do not go through the whole test paper before beginning to answer it.
4. Begin with the first question and keep on trying one question after another till you finish the entire test paper.
5. If you do not know the answer to any question, do not spend much time on it and pass on to the next one. Time permitting, you can come back to try them again.
6. There are three different forms of Objective questions in this test paper as mentioned below:
 - (i) Question Nos. 1-4 and 5-8 are two separate sets of True-False items.
 - (ii) Question Nos. 9-12 are Column Matching items.
 - (iii) Question Nos. 13-25 are Multiple-choice items, each having four suggested answers.Attempt these questions according to the instructions given in the beginning of each set.
7. Each question carries one mark only.

Question Nos. 1-4 are True-False items. Each statement mentions about the adaptation of an organism which is either true or false. Read each statement carefully to find-out whether it is true (T) or false(F). Record your answer by writing T or F as your answer in the space provided against the serial number of the question in your answer-sheet.

- Q.1 A waterlily plant having huge circular floating leaves with an oily coat on its surface is well adapted to prevent loss of water.
- Q.2 A buffalo having black skin and poor sweat glands is well adapted to wetlands.
- Q.3 A chameleon having a short dry tongue is remarkably adapted to capture insets.
- Q.4 A cactus plant having leaves reduced to spines is well adapted to desert environment.

Question Nos. 5-6 are True- False items which state processes of adaptation and/or changes in habitat conditions either correctly or wrongly. Read each of the statement carefully and record your answer by writing T, if it is true, or F, if it is false in the space provided against the serial number of the question in your answer-sheet.

- Q.5 The process of natural selection of species usually takes few generations.

- Q.6 The afforestation of land is a right step to improve the health of the environment.
- Q.7 A skill of good hand-writing developed by a man is said an acquired trait.
- Q.9 The water hyacinth drains most of the nutrients from the soil of the pond.

Question Nos.9-12 are Column Matching items. The Column I provides a list of different habitats and the Column II mentions sets of two examples each. Match each item of Column I with appropriate set of Column II. Use sets of Column II only once. Record your answer by writing the letter in the space provided against the corresponding serial number of the question in your answer-sheet.

Column I

Column II

- | | | |
|------|-------------|---------------------------------|
| Q.9 | Aquatic | A. Crocodile and toad |
| Q.10 | Terrestrial | B. Crocodile and frog |
| Q.11 | Arboreal | C. Camel and Cat |
| Q.12 | Amphibious | D. Trout and frog |
| | | E. Trout and <u>Vallisneria</u> |
| | | F. Water hyacinth and frog |
| | | G. Crow and cat |
| | | H. Swallow and eagle |
| | | I. Egret and buff lark |

Questions Nos. 13-25 are Multiple-choice items. Write the letter of the correct answer in the space provided against the corresponding serial number of the question in your answer-sheet.

Q.13 Which of the following microhabitats is most suitable for rhinoceros?

- A. Fresh water lakes
- B. Salt water lakes
- C. Dry lands
- D. Wet lands

Q.14 Which of the following plants float freely on the surface of water?

- A. Lemna
- B. Waterlily
- C. Vallisneria
- D. None of the above

Q.15 The legume plants on developing root nodules containing Rhizobium gets better supply of

- A. sugars
- B. mineral salts
- C. nitrogen
- D. fats

Q.16 Man is the most potent factor in the environment because he can

- A. kill all types of organisms
- B. manipulate his habitat
- C. domesticate wild animals
- D. grow all types of crops

Q.17 Habitat of an Organism is defined as its natural environment which consists of

- A. physical conditions and living inhabitants.
- B. geographical conditions of temperature and rainfall.
- C. living Organisms such as plants and animals.
- D. tropical forests of South India, Malay and Indonesia.

Q.18 An organism is said to be well adapted in a habitat where it can

- A. modify its environment suitably.
- B. get suitable environmental temperature.
- C. get plenty of food throughout the year.
- D. live and produce offsprings normally.

Q.19 The desert rat burrows deep in the ground because it

- A. gets a dark and airy place for rest.
- B. gets a cool and moist place for rest.
- C. makes a search of water in the depth.
- D. burrows easily in the soil.

Q.20 The relationship between the egret and buffalo is almost similar to that exists between

- A. mosquito and man.
- B. tick bird and rhinoceros.
- C. malarial parasite and mosquito.
- D. lice and buffalo.

Q.21 Spirogyra plants do not thrive well if transferred to sea water from its natural habitat because its filaments

- A. can not remain submerged in salt water.
- B. are broken into pieces by sea-waves.
- C. are carried away by the sea-waves.
- D. lose water from its cells.

Q.22. The Camel increases its internal temperature from 37°C to 41°C when the outside temperature is as high as 45°C . This increase in its body temperature helps it in

- A. reducing perspiration.
- B. reducing breathing rhythm.
- C. increasing breathing rhythm.
- D. increasing perspiration.

Q.23 Which of the following outcomes may result if we increase the number of tigers in a forest community?

- A. The increased number of tigers would bring better balance in the community.
- B. The undergrowth of the forest would start decreasing in mass.
- C. The deers' population would start decreasing in number.
- D. The forest trees would start decreasing in number.

Q.24 A housewife sprayed an insecticide in her house. All insects except a few mosquitoes were killed. After a month she sprayed the same insecticide again. She was surprised to see that the same type of mosquitoes survived this time much more in number. Which is of the following conclusions most appropriate on the basis of this data?

- A. All insects except mosquitoes are susceptible to the insecticide.
- B. A few mosquitoes escaped from the insecticide spray which increased in number by reproduction.
- C. A few mosquitoes tolerated the insecticidal spray which produced similarly tolerant progeny.
- D. The mosquitoes which escaped the insecticidal spray produced insecticide-resistant progeny.

Q.25 Which one of the following effects of deforestation leads to floods?

- A. Excessive water percolation into the soil.
- B. Water flow at very high speed.
- C. Extensive soil erosion.
- D. Silting of the river bed.

(D) ANSWER SHEET FOR THE UNIT TEST

Name of the Student _____

Class & Section _____ S.P.No. _____

Record your answer by writing the letter of the correct alternative in the space provided in this answer sheet against the serial number of the question

Serial Number of the Question	Space for the letter of the correct answer	Serial Number of the Question	Space for the letter of the correct answer
1.		14	
2.		15	
3.		16	
4.		17	
5.		18	
6.		19	
7.		20	
8.		21	
9.		22	
10.		23	
11.		24	
12.		25	
13.			

(Signature of the Candidate)

(F) QUESTION - WISE ANALYSIS OF THE UNIT TEST

Q. No.	Objective	Specification	Sub-unit Number	Form of Question	Marks Allocated	Estimated Time (Minutes)	Estimated Difficulty level
1.	K	Recognizes	SU-2	T/F	1	1+1	C
2.	K	Recognizes	SU-3	T/F	1	1	C
3.	K	Recognizes	SU-3	T/F	1	1	B
4.	K	Recognizes	SU-3	T/F	1	1	C
5.	K	Recognizes	SU-5	T/F	1	1+1	B
6.	K	Recognizes	SU-6	T/F	1	1	B
7.	U	Translates	SU-5	T/F	1	1	B
8.	U	Detects error	SU-6	T/F	1	1	B
9.	U	Cites examples	SU-1	MAT	1	1+1	B
10.	U	Cites examples	SU-1	MAT	1	1	B
11.	U	Cites examples	SU-1	MAT	1	1	B
12.	U	Cites examples	SU-1	MAT	1	1	B
13.	K	Recognizes	SU-1	MPC	1	1	C
14.	K	Recognizes	SU-2	MPC	1	1	C
15.	K	Recognizes	SU-4	MPC	1	1	C
16.	K	Recognizes	SU-6	MPC	1	1	B
17.	U	Translates	SU-1	MPC	1	1	B
18.	U	Interprets	SU-2	MPC	1	1	B
19.	U	Explains	SU-3	MPC	1	1	B
20.	U	Compares	SU-4	MPC	1	1	A
21.	A	Gives reasons	SU-2	MPC	1	1	A
22.	A	Analyses	SU-3	MPC	1	1 1/2	A
23.	A	Predicts	SU-4	MPC	1	1 1/2	A
24.	A	Infers	SU-5	MPC	1	2	A
25.	A	Judges	SU-6	MPC	1	1	A

T/F ==True-False

MAT ==Matching Item

MPC ==Multiple-Choice

UNIT 2

STUDY OF BIRDS

COMPONENTS OF THE UNIT TEST:

- (A) Design
- (B) Blue print
- (C) Test Paper
- (D) Scoring key and Marking scheme
- (E) Question-wise Analysis.

TEXT BOOK MATERIAL USED:

CHAPTER 16: WAYS OF LIVING: BIRDS,
SCIENCE - A Textbook For Class IX
(Part-II), N.C E.R.T., Publication,
1983.

(A) DESIGN OF THE UNIT TEST

SUBJECT: SCIENCE (BIOLOGY)
 UNIT : Study of Birds
 CLASS : IX
 TIME : 30 Minutes
 MARKS : 20

1. Weightage of Objectives:

Objectives	:	K	U	A	TOTAL
Percentage of marks:		25%	50%	25%	100%
Marks	:	5	10	5	20

2. Weightage to Form of Questions:

Forms of Questions	:	LA	SA	VSA	MPC	TOTAL
No. of Questions	:	1	3	4	6	14
Marks Allotted	:	4	6	4	6	20
Estimated Time	:	10	10	4	6	30
		mts.	mts.	mts.	mts.	mts.

3. Weightage to Content:

Sub-unit Number	Sub-units	Marks
SU-1	Habitats and Bird Communities (p.179-182)	4
SU-2	Body Structure and Feeding Habits (p.182-186)	6
SU-3	Birds Behaviour (p.186-189)	5
SU-4	Procedure for Studying Birds (p.181, 189-191)	5
Total		20

4. Difficulty Level: A - 25% , B - 50%, C - 25%

5. Scheme of Sections: Nil

6. Scheme of Options : Nil

Abbreviations:

K = Knowledge, U= Understanding, A= Application;
 LA= Long-answer, SA= Short-answer, VSA=Very short-answer
 O=OBJECTIVE; A= Difficult, B= Average, C= Easy.

(B) BLUE PRINT

SUBJECT: Science (Biology)
UNIT : Study of Birds

CLASS : IX
Marks : 20
TIME : 30 minutes

Sub- Unit No.	Knowledge			Understanding					Application					Skill		TOTAL
	LA	SA	VSA	C	LA	SA	VSA	O	LA	SA	VSA	O	LA	SA		
SU-1	-	-	1(1)	-	-	2(1)	-	-	-	-	-	1(1)	-	-	4(3)	
SU-2	-	-	-	1(1)	-	-	1(1)	1(1)	-	2(1)	-	1(1)	-	-	5(5)	
SU-3	-	2(1)	-	-	-	-	1(1)	1(1)	-	-	-	1(1)	-	-	5(4)	
SU-4	-	-	1(1)	-	2(1)	-	-	-	-	-	-	-	-	-	5(2)	
Sub Total	-	2(1)	2(2)	1(1)	4(1)	2(1)	2(2)	2(2)	-	2(1)	-	3(3)	-	-	20(14)	
Total	-	-	5(4)	-	-	-	-	-	-	-	-	-	-	-	-	

NOTE: 1. Figures within brackets indicates the number of questions and figures outside the brackets indicates marks.
 2. *Denotes that marks have been assigned to form one question.

SUMMARY:	1. Long Answer (LA)	NO. 1	Marks 4
	2. Short Answer (SA)	NO. 3	Marks 6
	3. Very Short Answer (VSA)	NO. 4	Marks 4
	4. Objective (O)	NO. 6	Marks 6

(C) TEST PAPER

Subject : Science (Biology)
Unit : Study of Birds
Class : IX
Max. MARKS : 20
Time : 30 minutes

INSTRUCTIONS:

1. There are 14 questions in all.
2. All questions are compulsory.
3. Marks for each question are indicated against it.
4. Question Nos. 1 to 6 are multiple choice questions, each having four alternative answers but with only one correct answer. Write your answer in your answer book by giving the serial alphabet of the correct answer chosen along with the serial number of the question.
5. Question Nos. 7 to 10 are Very-short answer questions requiring only one word to one sentence answer. Answer them accordingly.
6. Question Nos. 11 to 13 are short-answer questions. Please answer them in about 30 to 50 words.
7. Question No. 14 is a long-answer question which is to be answered in about 40 to 80 words.
8. No marks shall be deducted for writing answers lengthier or shorter than desired.
9. Answers should be to the point.
10. Do not give diagrams unless asked for it.

1. Which of the following birds possesses a binocular vision?
 - A. Pariah kite
 - B. Barn owl
 - C. Sunbird
 - D. Crow

1
2. Which of the following types of beaks suits most to the birds of prey?
 - A. Long and curved
 - B. Small and pointed
 - C. Long and slender
 - D. Strong and curved

1
3. Which of the following birds roosts in large aggregation as well as nests in natural holes in trees for raising its own chicks?
 - A. House crow
 - B. Koel
 - C. Myna
 - D. Bulbul

1
4. A group of five students investigated that 21 kinds of birds were present in winter season of a particular habitat. Another group of six students found that there were 22 kinds of birds present in the winter season of another habitat. Which of the following conclusions is the most appropriate on the basis of this data?
 - A. The two habitats have several different ecological niches.
 - B. The two habitats have two different set of birds.
 - C. The two habitats differ widely in the types of ecological niches.
 - D. The former habitat offers fewer ways of making a living.

1

5. Equal amounts of grains were kept in four similar bowls for feeding four different kinds of birds, Which of them would eat the grains at the fastest rate?
- A. Short, curved beaked bird
 - B. Short, pointed beaked bird
 - C. Long, flat beaked bird
 - D. Long, narrow beaked bird 1
6. A group of students visited a locality three times to find-out how many different kinds of birds are living there. They could not locate a few kinds of birds, which of the following reasons accounts it most appropriately?
- A. Certain kinds of birds run very fast on the land.
 - B. Certain kinds of birds fly very high in the sky.
 - C. Certain kinds of birds hide in the bushes around.
 - D. Certain kinds of birds merge with the surroundings. 1
7. State why cattle egret is usually seen with grazing buffaloes. 1
8. Mention any four characteristics of birds which are important in their identification. 1
9. Name the bird which is characterised by short broad wings and "kuk-kuk" call. 1
10. Explain why house sparrow is termed as a ridiculous bird. 1

11. State the method used by the female Koel to get her chicks raised. 2
12. Mention any two external characteristics on the basis of which male sparrow is differentiated from the female sparrow. 2
13. A bird feeds exclusively on small insects in air. What characteristics should its wings and tail possess to suit this requirement? Specify giving reasons. 2
14. Explain how would you determine the diversity of the bird population of a habitat employing the "Line-transect" method. 4

(D) SCORING-KEY AND MARKING-SCHEME

Subject : Science (Biology) Class : IX
Unit : Study of Birds Marks : 20
Time : 30 Minutes

Q.No.	Value-points Key	V.F. wise Marks	Total Marks
1.	B	1	1
2.	D	1	1
3.	C	1	1
4.	A	1	1
5.	B	1	1
6.	D	1	1
7.	To feed soil insects which becomes visible when the ground soil is disturbed by the movement of buffaloes.	$\frac{1}{2}$	1
8.	<u>Any four:</u> size of the bird; size and shape of beaks; colour, size and shape of wings; size & shape of tails; size and shape of claws; habitat; any special feature.	(1*1/2)	1
9.	Copper Smith	1	1
10.	Because their chicks stay in the nest for several weeks.	1	1
11.	A. Slipping of an egg in Crow's nest B. Female crow does not know about it and raises the chick as her own.	1 1	

Q.No.	Value-Points Key	V.P. wise marks	Total Marks
12.	<u>Any two</u>		
1.	Presence of black-bearded like patch from chin to chest in the male.	1	
2.	Presence of reddish brown backs in the male (paler brown in the female)	1	
3.	Presence grey coloured head in the male (female has an almost uniformly paler brown colour of the body.	1	2
13.	A. Long, slender, slightly curved wings; helps in flying fast in the air.	$\frac{1}{2} + \frac{1}{2}$	
	B. Long forked tail; helps in twisting and twining sharply.	$\frac{1}{2} + \frac{1}{2}$	2
14.	A. Moving in a straight line for about 600 meters; stopping every 10 meters for 2 min.	1	
	B. Observing birds within 100 m on either side.	1	
	C. Recording names/or characteristics of birds.	1	
	D. Repetition of the exercise on several different days and comparing the results.	1	4

(E) QUESTION-WISE ANALYSIS

Subject: Science (Biology) Unit : Study of Birds

Class : IX Max. Marks: 20 Time: 40 Min.

Q. No.	Objective Specification	Content Sub-Unit Number	Form of Questions	Marks Allowed	Approx. time Min.	Estimated difficulty level
1.	K recognises	SU-2	O	1	1	C
2.	U identifies relationship	SU-2	O	1	1	B
3.	U compares	SU-3	O	1	1	A
4.	A infers	SU-1	O	1	1	A
5.	A analyses	SU-2	O	1	1	A
6.	A makes hypothesis	SU-3	O	1	1	A
7.	K recalls	SU-1	VSA	1	1	C
8.	K recalls	SU-4	VSA	1	1	B
9.	U cites examples	SU-2	VSA	1	1	B
10.	U explains	SU-3	VSA	1	1	B
11.	K recalls	SU-3	SA	1	1	C
12.	U differentiates	SU-1	SA	2	3	B
13.	A establishes relationship	SU-2	SA	2	4	A
14.	U translates	SU-4	LA	4	10	

Abbreviations:

K = Knowledge, U= Understanding, A= Application
 O= objective, VSA= Very-short-answer, SA=Short-answer, LA= Long-answer; A=Difficult, B= Average, C= Easy.

.....

UNIT 3

ORGANISATION IN THE LIVING WORLD

COMPONENTS OF THE UNIT TEST:

- (A) Design
- (B) Blue print
- (C) Test paper
- (D) Scoring-key and Marking-scheme
- (E) Question-wise Analysis

TEXT BOOK MATERIAL USED:

Chapter 17: Organisation in the Living World,
Science - A Textbook for Class IX (Part II),
N.C.E.R.T. Publication, 1988.

(A) D E S I G N

SUBJECT: Science (Biology)

Class : IX
Time : 30 Min.

UNIT : Organisation in the
Living World

Marks : 20

1. WEIGHTAGES TO OBJECTIVES:

	K	U	A	S	TOTAL
OBJECTIVES	25%	45%	20%	10%	100%
PERCENTAGE OF MARKS	5	9	4	2	20
MARKS					

2. WEIGHTAGES TO FORM OF QUESTIONS

	LA	SA	VSA	O	TOTAL
FORMS OF QUESTIONS	1	3	4	6	14
NO. OF QUESTIONS					
MARKS ALLOTTED	4	6	4	6	20
ESTIMATED TIME (MIN.)	8	12	4	6	30

3. WEIGHTAGE TO CONTENT:

<u>CONTENT-SUB-UNITS</u>	<u>MARKS</u>
1. Levels of Organisation(17.1, 17.2)	4
2. Cell Structure(17.3)	6
3. Cell Division (17.4)	7
4. Crossing OVER (17.5)	3
TOTAL	20

4. Estimated Difficulty Level:

Difficulty: 25%, Average: 50% , Easy: 25%

5. Scheme of Sections: No sections in the test paper
6. Scheme of options: No options for the pupils

K= Knowledge, U= Understanding, A= Application, S=Skill;
LA= Long-answer, SA= Short-answer, VSA= Very-short-answer,
O= Objective; A= Difficult, B= Average, C= Easy Question.

(B) BLUE PRINT

SUBJECT: Science (Biology)

Class : IX

UNIT : Organisation in the Living World

Time : 30 min.
Marks : 20

Sub-unit Number	Knowledge			Understanding			Application			Skill			Total
	L.	SA	VS	L.	SA	VS	L.	SA	VS	L.	SA	VS	
SU-1	-	2(1)	-	-	-	-	1(1)	-	-	1(-)	-	-	4(3)
SU-2	-	-	-	1(1)	2(1)	-	-	-	-	1(1)	-	2(1)	6(4)
SU-3	-	-	-	1(1)	1(1)	-	1(1)	-	-	1(1)	-	-	7(4)
SU-4	-	-	1(1)	-	-	1(1)	-	-	-	1(1)	-	-	3(3)
Sub-Total	2(1)	1(1)	2(2)	4(1)	2(1)	2(2)	1(1)	-	-	1(4)	3(3)	2(1)	20(14)
Total	5(4) 9(5) 4(4) 2(1)												

NOTE: 1. Figures within brackets indicates the number of questions and figures outside the brackets indicate marks.
2. *Denotes that marks havebeen combined to form one question.

SUMMARY:	1. Long Answer (LA)	No. 1	Marks 4
	2. Short Answer (SA)	No. 3	Marks 6
	3. Very Short Answer (VS)	No. 4	Marks 4
	4. Objective (O)	No. 6	Marks 6

(C) TEST PAPER

SUBJECT : SCIENCE (BIOLOGY) TIME : 30 MINUTES
CLASS : IX
UNIT : MAX. MARKS : 20

INSTRUCTIONS:

1. There are 14 questions in all.
2. All questions are compulsory, and so there is no need to read through the whole test paper before beginning to answer it.
3. Begin with the first question and keep on trying one question after another till you finish the entire test paper.
4. If you do not know the answer to any question, do not spend much time on it and pass on to the next one. Time permitting, you can come back to try them again.
5. Question nos. 1 to 6 are multiple-choice questions, each having four suggested answers. You have to choose the correct or most appropriate one and indicate the same by mentioning the serial alphabet along with the question number in your answer book.
6. Question Nos. 7 to 10 are very short-answer questions and each one requires one word to one sentence answer. Attempt them accordingly.
7. Question Nos. 11-13 are short-answer questions. Answer them in about 30-50 words.
8. Question Nos. 14 is a long-answer question and needs an answer of about 50-60 words. Answer it accordingly.
9. Marks of each question are indicated against it.
10. No marks shall be deducted for writing answers lengthier or shorter than desired but answer questions to the point.
11. Do not give diagrams until unless asked for it.

1. Which of the following functions is performed by Golgi apparatus ?
 - A. Synthesis and storage of proteins
 - B. Synthesis and storage of hormones
 - C. Processing and packaging of secretions
 - D. Processing and packaging of chromatin 1
2. Which of the following sequences shows the correct order of events in a mitotic division ?
 - A. Interphase, prophase, anaphase, telophase
 - B. Anaphase, metaphase, telophase, interphase
 - C. Prophase, metaphase, anaphase, telophase
 - D. Prophase, metaphase, telophase, anaphase
3. Which one of the following groups represents organs of the same organ-system ?
 - A. Lungs, pharynx, trachea and pancreas
 - B. Intestine, stomach, rectum and Oesophagus
 - C. Mouth cavity, trachea, Oesophagus and stomach
 - D. Mouth cavity, pancreas, lungs and intestine
4. Due to mutation, the function of oxidation of food was impaired in a plant cell. Which of the following could be the most probable cause ?
 - A. Mitochondria did not receive Oxygen
 - B. Mitochondria did not produce ATP
 - C. Mitochondrial enzymes functioned slowly
 - D. Mitochondrial enzymes were denatured
5. Which of the following statements supports the concept, "Somatic cells die while germ cells do not."
 - A. Germ cells divide by meiosis to produce the first cell of the next generation.
 - B. Somatic cells divide by mitosis to produce the first cell of the next generation.
 - C. Somatic cells produce gametes which unite to produce the first cell of the next generation.
 - D. Germ cells produce gametes which unite to produce the first cell of the next generation.

university of ...

- 58
6. A woman gave birth to triplets, out of which one was female and two were male. This situation is possible only when
- A. two ova are fertilized, each one by a sperm
 - B. three ova are fertilized, each one by a sperm
 - C. one ovum is fertilized by two sperms
 - D. one ovum is fertilized by three sperms
7. State the importance of crossing over in sexually reproducing organisms.
8. How does the division of cell cytoplasm in a plant cell differ from that in an animal cell?
9. Where is no exchange of segments between homologous chromosomes during mitosis, why?
10. A student examined amoeba, hydra, earthworm and cockroach and concluded that amoeba is a simple organism in structure and function than the other three. Mention the basic principle underlying this conclusion.
11. State the four higher levels of organisation, giving meaning of each.
12. Mention any four differences between human cheek cells and gram leaf cells in a tabular form.
13. Draw a labelled diagram showing the sub-microscopic structure of a nucleus.
14. Elucidate the sequence of events that take place during meiotic cell division of a diploid cell. State only the first meiotic division; no diagram is required.

(D) SCORING-KEY AND MARKING-SCHEME OF THE UNIT TEST

Subject : Science (Biology) Marks : 20
Unit : Organisation in the Living World Time : 30 Min.
Class : IX

Q.No.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS	TOTAL MARKS
1.	C	1	1
2.	C	1	1
3.	B	1	1
4.	D	1	1
5.	D	1	1
6.	A	1	1
7.	Crossing over leads to variability in the genes of the gametes.	1	1
8.	Plant cell cytoplasm does not divide by constriction in the cell wall; instead it divides by depositing cell plates.	$\frac{1}{2} + \frac{1}{2}$	1
9.	Because the homologous chromosomes do not pair length-wise during mitosis, and so no exchange of segments.	1	1

Q.No.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS
10.	Basic principle is that Amoeba has only upto cellular-level of organization; while others being multi-cellular exhibit beyond this	$\frac{1}{2} + \frac{1}{2}$
11.	(1) Population level: All individuals of a species in a locality	$\frac{1}{2}$
	(2) <u>Biotic Community</u> : All species or populations of a locality	$\frac{1}{2}$
	(3) <u>Ecosystem</u> : Both living and non-living components of a locality e.g., a small pond	$\frac{1}{2}$
	(4) <u>Biosphere</u> : All ecosystems of the world.	$\frac{1}{2}$
12.	Any four of the following	
	<u>Characters</u> <u>Check Cells</u> <u>Leaf Cells</u>	
	(1) Cell-wall Absent present	
	(2) Chloroplast Absent present	
	(3) Vacuole No single large vacuole Single large vacuole present	
	(4) Centrosome Present absent	
	(5) Cytoplasm Fills the entire space of the cell forms a thin layer	$\frac{1}{2} \times 4$
	(6) Any other	
13.	<u>Any four parts drawn and labelled correctly:</u>	
	(1) Nucleolus	
	(2) Nuclear membrane	
	(3) Pores in the nuclear membrane	$\frac{1}{2} \times 4$
	(4) Chromatin	
	(5) Any other	

Q.No.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS	TOTAL MARKS
14.	A. <u>Interphase</u> : Duplication of DNA as the preparation for the nuclear division;	$\frac{1}{2}$	
	B. <u>Prophase I</u> : Appearance of chromosomes as thin threads; pairing between homologous chromosomes;	$\frac{1}{2}$	
	Each chromosome with two chromatids but single centromere; exchange of chromosome parts;	$\frac{1}{2}$	
	Disappearance of nuclear membrane; movement of centrioles to either poles .	$\frac{1}{2}$	
	C. <u>Metaphase I</u> : Formation of spindle; arrangement of chromosomes on the equatorial plane.	$\frac{1}{2}$	
	Division of Centrioles; separation of homologous chromosomes.	$\frac{1}{2}$	
	D. <u>Anaphase I</u> : Movement of chromosomes (one from each pair of homologous chromosomes) to the either poles.	$\frac{1}{2}$	
	E. <u>Telophase I</u> : λ haploid set of chromosomes at the poles.	$\frac{1}{2}$	$\frac{4}{2}$

QUESTION-WISE ANALYSIS

Subject : Science (Biology) Unit : Organisation in the Living World

Class : IX

Max.
Marks : 20

Time : 30 Min.

Q. No.		Objective Specification	Content Sub-Unit Number	Form of Questions	Marks Allowed	Approx. time	Estimated difficulty level
1.	K	Recognises	SU-2	O	1	1	C
2.	K	Recognises	SU-3	O	1	1	C
3.	U	Identifies relationship	SU-1	O	1	1	B
4.	L	Makes hypothesis	SU-2	O	1	1	A
5.	A	Judges	SU-3	C	1	1	A
6.	A	Analyses	SU-4	O	1	1	A
7.	K	Recalls	SU-4	VSA	1	1	C
8.	U	Compares	SU-3	VSA	1	1	B
10.	L	Analyses	SU-1	VSA	1	1	A
11.	K	Recalls	SU-1	SA	2	4	C
12.	U	Compares	SU-2	SA	2	4	B
13.	S	Draws and labels	SU-2	SA	2	4	B
14.	U	Interprets	SU-3	LT	4	10	B

Note: For abbreviations, please refer the design.

UNIT 4

LIFE PROCESSES - I : NUTRITION

COMPONENTS OF THE UNIT TEST:

- (A) Design
- (B) Blue print
- (C) Test paper
- (D) Scoring-key and Marking-scheme
- (E) Question-wise Analysis.

TEXT BOOK MATERIAL USED:

CHAPTER 18 : Life Processes-I;

SCIENCE - A TEXTBOOK FOR CLASS IX (Part-II),
N.C.E.R.T. Publication, 1983.

(A) D E S I G N

SUBJECT: Science (Biology)
UNIT : LIFE PROCESSES-I :
NUTRITION

Class :IX
Time :30 Min.
Marks :20

1. WEIGHTAGES TO OBJECTIVE

	K	U	A	S	TOTAL
OBJECTIVES					
PERCENTAGE OF MARKS	25%	30%	35%	10%	100%
MARKS	<u>5</u>	<u>6</u>	<u>7</u>	<u>2</u>	<u>20</u>

2. WEIGHTAGES TO FORM OF QUESTIONS:

FORMS OF QUESTIONS	LA	SA	VSA	O	TOTAL
No. of QUESTIONS	1	3	5	5	14
MARKS ALLOTTED	4	6	5	5	20
ESTIMATED TIME(Min.)	10	12	4	4	30

3. WEIGHTAGE TO CONTENT:

<u>CONTENT-SUB-UNITS</u>	<u>MARKS</u>
1. Nutrition (Ch.18.1)	2
2. Photosynthesis (Ch.18.2)	3
3. Respiration(Ch.18.3)	3
4. Transport (Ch. 18.)	2
5. Blood Circulation and Lymph (Ch.18.5 and 18.6)	6
6. Excretion (Ch. 18.7)	4
<u>TOTAL</u>	<u>20</u>

4. Estimated Difficulty Level:

Difficult 35%, Average 40%, Easy 25%.

5. Scheme of sections: Nil

6. Scheme of options : No options

K= Knowledge, U= Understanding, A= Application, S= Skill,
LA= Long-answer, SA= Short-answer, VSA= Very-short-answer,
O= Objective; A= Difficult, B= Average, C= Easy Question.

(B) BLUE PRINT

SUBJECT: Science (Biology)

UNIT : Life Processes-I

CLASS : IX
TIME : 30 Min.
MARKS : 20

Sub-Unit Number	Knowledge			Understanding			Application			Skill			Total		
	L ₁	SA	VSA	0	L ₂	SA	VSA	0	LA	SA	VSA	0		LA	SA
SU-1			1(1)						1(1)						2(2)
SU-2			1(1)						2(1)						3(2)
SU-3					2(1)							1(1)			3(2)
SU-4				1(1)					1(1)						2(2)
SU-5			1(1)						1(1)	4(1)					6(3)
SU-6				1(1)					1(1)					2(1)	4(2)
Sub-Total	-	-	3(3)	2(2)	-	2(1)	2(2)	2(2)	4(1)	2(1)	-	1(1)	-	2(1)	
Total			5(5)			6(5)			7(3)			2(1)			20(14)

99

NOTE: 1. Figures within brackets indicates the number of questions and figures outside the brackets indicate marks.
2. "Denotes that marks have been combined to form one question.

SUMMARY: 1. Long-answer (LA) No. 1 Marks : 4
2. Short-answer (SA) No. 3 Marks : 6
3. Very-Short-answer (VSA) No. 5 Marks : 5
4. Objective(O) No. 5 Marks : 5

(C) TEST PAPER

Subject : Science (Biology)
Class : IX
Unit : Life Processes-I
Time : 30 Min.
Max. Marks : 20

INSTRUCTIONS

1. There are 14 questions in all.
2. All questions are compulsory.
3. Marks for each question are indicated against it.
4. Question Nos. 1 to 5 are Multiple-choice questions each having four alternative answers but with only one correct answer. Write the letter of the correct answer along with the serial number of the question in your answer book.
5. Question Nos. 6 to 10 are Very-short-answer questions requiring only one word to one sentence answer.
6. Question Nos. 11 to 13 are Short-answer-questions. Please answer them in about 30-50 words.
7. Question No. 14 is a Long-answer question and requires an answer of 50-80 words.
8. No. marks shall be deducted for writing answer lengthier or shorter than desired.
10. Do not give diagrams until unless asked for it.

1. Which of the following structures is used for the upward translocation of water and mineral salts ?
 - A. Sieve tube
 - B. Xylem vessel
 - C. Phloem parenchyma
 - D. Guard Cell1
 2. Which of the following terms is used for the process of removing waste products from out body ?
 - A. Transpiration
 - B. Egestion
 - C. Respiration
 - D. Excretion1
 3. A tiger accomplishes the following stages in order to get its nutrition:
 1. eats other animals;
 2. removes undigested food out of the body;
 3. absorbs food in its blood stream;
 4. breaks down macromolecules into smaller molecules.1
- Which of the following sequences shows the correct order of these steps taken by the body ?
- A. 1,2,3,4
 - B. 1,4,2,3
 - C. 1,4,3,2.
 - D. 1,3,2,4
- 1

4. Which cell types of the following names aid in fighting infection ?
 - A. Leucocytes and Lymphocytes
 - B. Erythrocytes and Leucocytes
 - C. Thrombocytes and erythrocytes
 - D. Lymphocytes and thrombocytes1
5. After a heavy exercise, a person felt pain in his legs and arms. This may be due to an accumulation of
 - A. acetic acid
 - B. lactic acid
 - C. carbonic acid
 - D. ethyl alcohol

6. Name the mode of nutrition in which an organism makes its own food from simple raw materials.
7. Give the chemical equation used to represent photosynthesis.
8. Name the valve which governs the flow of blood from right atrium to right ventricle.
9. Define osmosis in your own words.
10. Explain how glomerulus functions as a dialysis bag.
11. State any two major differences between burning of coal and respiration in a tabular form.
12. A potted plant was covered with a small transparent polythene bag from all sides to prevent cross pollination. How would it affect the rate of photosynthesis ? Specify.
13. Draw a labelled diagram showing the position of kidneys and associated structures in man.
14. During walking, the muscles of our legs consume Oxygen. How does it reach to the muscle cells from the atmosphere ? Provide the various steps involved in it

(D) SCORING KEY AND MARKING SCHEME OF THE UNIT TEST

Subject : Science (Biology) Class : IX
Unit : Life Processes-I Marks : 20
Time : 30 Min.

Q.No.	VALUE POINTS/KEY	VALUE POINTS WISE MARKS	TOTAL MARKS
1.	B	1	1
2.	D	1	1
3.	C	1	1
4.	A	1	1
5.	B	1	1
6.	Autotrophic mode of nutrition	1	1
7.	$6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{Chlorophyll}]{\text{Light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	$\frac{1}{2} + \frac{1}{2}$	1
8.	Tricuspid valve	1	1
9.	Definition should include:		
	(i) Two solutions having a common solvent separated by a semi-permeable membrane;	$\frac{1}{2} + \frac{1}{2}$	1
	(ii) Diffusion of solvent molecules from a weaker solution to a stronger solution.		

Q.No.	VALUE POINTS/KEY	VALUE POINTS TYPE MARKS	TOTAL MARKS
10.	Glomerulus filters out smaller molecules through its thin walls under pressure retaining larger molecules in the blood.	1+1/2	1
11.	<u>Any two:</u>		
	(1) Respiration takes place at lower temperatures while burning of coal requires high temperature of five.		
	(2) Energy in respiration released step by step but in burning in one single step.		
	(3) Energy is stored as ATP in respiration while in burning released as heat.	1x2	2
12.	A. The rate of photosynthesis gradually slows down;	1/2	
	B. Because the amount of CO ₂ decreases in the air of the bag;	1/2	
	C. As plants consume more CO ₂ per day in photosynthesis than released in respiration;	1/2	
	D. Polythene bag does not allow exchange of gases between the area covering the plant and the outside atmosphere.	1/2	2

Q.No.	VALUE POINTS/KEY	VALUE POINTS	TOTAL
		TEST MARKS	MARKS
13.	Any four, each drawn and labelled correctly:		
	(1) Two kidneys	$\frac{1}{2}$	
	(2) A pair of ureters	$\frac{1}{2}$	
	(3) Urinary bladder and Urethra	$\frac{1}{2}$	
	(4) Renal artery and renal vein	$\frac{1}{2}$	2
14.	A. Intake of Oxygen from the atmosphere during breathing; thus, air is forced into the alveoli of the lungs	1	
	B. Absorption of O_2 by the haemoglobin of the blood present in the capillaries located in the walls of alveoli	1	
	C. Transport of O_2 loaded blood to the heart by the pulmonary vein, Pumping of blood by the heart into arteries including those carrying blood to legs.	1	
	D. Transport of O_2 -loaded blood from arterics to the capillaries surrounding the muscle cells of the legs; Diffusion of O_2 from the haemoglobin of the blood into the muscle cells.	1	4

QUESTION-WISE ANALYSIS

Subject : Science (Biology) Unit : Life Processes-I
 Class : IX Marks : 20 Time : 30 Min.

Q. No.	Objective	Specification	Content Sub-Unit Number	Form of Questions	Marks Allotted	App. time	Estimated difficulty level
1.	K	Recognises	SU-4	C	1	1	C
2.	K	Recognises	SU-6	O	1	1	C
3.	U	Relates	SU-1	O	1	1	D
4.	U	Compares	SU-5	O	1	1	B
5.	Z	Analyses	SU-3	O	1	1	A
6.	K	Recalls	SU-1	VSA	1	1	C
7.	R	Recalls	SU-2	VSA	1	1	C
8.	K	Recalls	SU-5	VSA	1	1	C
9.	U	Translates	SU-4	VSA	1	1	D
10.	U	Explains	SU-6	VSA	1	1	B
11.	U	Compares	SU-3	C	2	3	B
12.	A	Establishes relationship	SU-2	SA	2	4	A
13.	S	Draws and labels	SU-6	SL	2	4	B
14.	A	Makes a unique communication	SU-5	LA	4	10	A

Note: For abbreviation, please refer the foot-note given on the Design.

UNIT 5

LIFE PROCESSES-II: REPRODUCTION AND CONTROL

COMPONENT'S OF THE UNIT TEST:

- (A) Design
- (B) Blue print
- (C) Test paper
- (D) Scoring key and Marking scheme
- (E) Question-wise Analysis.

TEXTBOOK MATERIAL USED:

CHAPTER 19 : Life Processes-II
SCIENCE - A Textbook for Class IX
(Part-II), N.C.E.R.T. Publication, 1988.

(A) D E S I G N

SUBJECT : Science (Biology)

Time : 30 Min.

UNIT : Life Processes-II,
Reproduction and Control

Marks : 20

Class : IX

1. WEIGHTAGES TO OBJECTIVE

OBJECTIVES	K	U	A	S	TOTAL
PERCENTAGE OF MARKS	20%	45%	20%	10%	100%
MARKS	4	9	5	2	20

2. WEIGHTAGES TO FORM OF QUESTIONS:

FORMS OF QUESTIONS	LA	SA	VSA	O	TOTAL
NO. OF QUESTIONS	1	3	5	5	14
MARKS ALLOTTED	4	6	5	5	20
ESTIMATED TIME (Min.)	8	12	5	5	30

3. WEIGHTAGE TO CONTENT:

CONTENT-VE-UNITS: MARKS

SU-1 Growth and Reproduction (19.1)	2
SU-2 Asexual Reproduction (19.2)	5
SU-3 Sexual Reproduction (19.3)	4
SU-4 Control and Coordination (19.4, 19.5, 19.6)	4
SU-5 Nervous System (19.7)	5
TOTAL	20

4. Estimated Difficulty Level:

Difficult: 25%, Average: 55%, Easy: 20%

5. Scheme of sections: Only one section

6. Scheme of options: No options

K= Knowledge, U= Understanding, A= Application, S= Skill,

LA= Long-answer, SA= Short-answer, VSA=Very-short answer,

O= Objective, A= Difficult, B= Average, C= Easy.

(B) BLUE PRINT

SUBJECT : Science (Biology)

MARKS : 20

UNIT : Life Processes-II

TIME : 30 Min.

CLASS : IX

Sub-Unit Number	Knowledge			Understanding			Application			Skill	
	LA	SA	VSA	LA	SA	VSA	LA	SA	VSA	LA	SA TOTAL
SU-1	-	-	-	1(1)	-	-	-	-	-	-	2(2)
SU-2	-	-	1(1)	-	4(1)	-	-	-	-	-	5(2)
SU-3	-	-	1(1)	-	-	1(1)	-	-	1(1)	1(1)	4(4)
SU-4	-	-	-	-	-	-	1(1)	-	2(1)	-	4(3)
SU-5	-	-	-	1(1)	-	2(1)	-	-	-	-	2(1)5(3)
Sub-Total	-	-	2(2)	2(2)	4(1)	2(1)	2(2)	1(1)	-	2(1)	1(1)2(2)
Total	4(4)			9(5)			5(4)			2(1)	20(14)

NOTE: 1. Figures within brackets indicates the number of questions and figures outside the brackets indicate marks.
2. *Denotes that marks have been combined to form one question.

SUMMARY: 1. Long-answer (LA)
2. Short-answer (SA)
3. Very-short-answer (VSA)
4. Objective (O)

NO.	<u>1</u>	Marks :	<u>4</u>
NO.	<u>3</u>	Marks :	<u>6</u>
NO.	<u>5</u>	Marks :	<u>5</u>
NO.	<u>5</u>	Marks :	<u>5</u>

(C) TEST PAPER

SUBJECT : Science (Biology) Time : 30 Min.
CLASS : VI Marks : 20
UNIT : Life Processes-II

GENERAL INSTRUCTIONS:

1. There are 14 questions in all.
2. All questions are compulsory.
3. Marks for each question are indicated against it.
4. Question Nos. 1 to 5 are multiple-choice questions, each having four alternative answers but with only one correct answer. Write the letter of the correct answer alongwith the serial number of the question in your answer book.
5. Question Nos. 6 to 10 are very-short-answer questions requiring only one word to one sentence answer, rarely two sentences.
6. Question Nos. 11 to 13 are short-answer questions. Please answer them in about 30-50 words. However, Question No. 13 needs a labelled diagram only.
7. Question No. 14 is a long-answer question and requires an answer of 50-80 words.
8. No marks shall be deducted for writing answers lengthier or shorter than the desired.
9. Answers should be to the point.
10. Do not give diagrams until unless asked for it.

1. Which of the following life-processes is concerned with continuity of life ?

A. Reproduction
B. Photosynthesis
C. Growth
D. Reproduction

1

2. Which of the following structures acts as the basic unit for transmitting information from one part of the body to another ?

A. Dendrite
B. Synapse
C. Neuron
D. Cerebrum

1

3. Which of the following effects is most likely to occur on removing the stem-tip of a young seedling ?

A. The stem loses chlorophyll
B. The stem bends towards light
C. The stem grows normally
D. The stem does not grow further

1

4. A farmer removes anthers of a flower and covers its pistil by a polythen bag before it attains maturity. Which of the following results is most expected in this situation

A. Viable but fewer seeds are formed
B. The resulting embryo does not survive
C. Seeds produced does not have seed coats
D. Fruits and seeds are not formed.

1

5. A patient was advised by a doctor to take insulin tablets every day for a week. Which of the following substances should have been detected in the urine of the patient calling for such an advice ?

A. Albumin
B. Sugar
C. Cortisone
D. Cytckinin

1

6. Mention one advantage of raising new individuals by tissue culture method. 1
7. State the number of male gametes usually present in the pollen-tubes of an angiosperm.
8. Why is growth localised in a pea plant while it is uniform throughout the body of a man ? 1
9. State the type of nuclear division by which a zygote divides to produce an embryo. 1
10. The fallopian tubes of a woman were cut and tied up at both the ends. How would it affect the process of fertilization ? 1
11. Explain how a reflex action occurs in response to a prick in the hand of a person. 2
12. A person changes his habitat from plains to a hilly area which is at the height of 3000 m above the sea-level. He stays there for long. His cheeks turn red, why ? Specify. 2
13. Give a labelled diagram of the left cerebral hemisphere of human brain showing the areas concerned with sight, hearing, eye muscles and sensation. 2
14. State any four different types of asexual reproduction occurring naturally in multicellular plants, giving an example of each. 4

(D) SCORING-KEY AND MARKING-SCHEME OF THE UNIT TEST

Subject: Science (Biology) Class : IX
Unit : Life Processes-II Time : 30 Min.
Marks : 20

Q.No.	VALUE POINTS/KEY	VALUE POINT- WISE MARKS	TOTAL MARKS
1.	A	1	1
2.	C	1	1
3.	D	1	1
4.	D	1	1
5.	B	1	1
6.	<u>Any one of the following:</u>		
	(i) Raising new individuals successfully from a small piece of tissue	1	
	(ii) Several plants identical to their parents are raised in short period	1	
	(iii) Any Other	1	1
7.	Two	1	1
8.	Due to presence of meristematic tissues in certain region only but human body does not have such tissues.	$\frac{1}{2} + \frac{1}{2}$	1
9.	Mitotic nuclear division	1	1
10.	The ovum fails to meet the sperm resulting no fertilization.	$\frac{1}{2} + \frac{1}{2}$	1
11.	Sensory receptors of skin receive the stimulus; passed on to spinal cord through sensory nerve fibres; response is sent to muscles of the hand through motor nerve fibres; Action is taken by muscles - withdrawal of the hand.	$\frac{1}{2} \times 4$	2

Q.No.	VALUE POINTS/KEY	VALUE POINT- WISE MARKS	TOTAL MARKS
12.	O ₂ is scarce at high altitudes. Human body brings physiological change to cope with this; produce more RBC (per unit volume of blood); it results reddening of cheeks.	1/2x4	2
13.	Diagram showing correct representation of the areas of hearing, sight, eye muscles, and sensation along with appropriate labelling.	1/2x4	2
14.	Any four of the following types of asexual reproduction:		
	(i) <u>Fragmentation</u> : Plant body breaks up into pieces, each piece grows into an individual; e.g., <u>Spirogyra</u> .	1/2+1/2	
	(ii) <u>Spore formation</u> : production of single celled spores, each forms a new individual; e.g., <u>Mucor</u> .	1/2+1/2	
	(iii) <u>Adventitious buds</u> produced on roots, stems, or leaves; each bud forms a new individual; e.g., sweet potato.	1/2+1/2	
	(iv) <u>'Eyes' or Axillary buds</u> produced in the axils of scaly leaves, which grows into new individuals; e.g., potato.	1/2+1/2	
	(v) Any other with one example.	1/2+1/2	4

(E) QUESTION-WISE ANALYSIS

Subject : Science (Biology)

Unit : Life Processes II

Class : IX

Marks : 50

Time : 30 Min.

Q. No.	Objective Specification		Sub-Unit Number	Form of Questions	Marks	Time (Min)	Estimated difficulty level
1.	K	Recognises	SU-1	O	1	1	C
2.	K	Recognises	SU-5	O	1	1	C
3.	U	Interprets	SU-1	O	1	1	B
4.	A	Infers	SU-3	O	1	1	A
5.	A	Analyses	SU-4	O	1	1	A
6.	K	Recalls	SU-2	VSA	1	1	C
7.	K	Recalls	SU-3	VSA	1	1	C
8.	U	Interprets	SU-1	VSA	1	1	B
9.	U	Identifies relationship	SU-3	VSA	1	1	B
10.	A	Establishes relationship	SU-3	VSA	1	1	A
11.	U	Explains	SU-5	SA	2	4	B
12.	A	Gives reason	SU-4	SA	2	4	A
13.	S	Draws and labels	SU-5	SA	2	4	B
14.	U	Translates	SU-2	LA	4	8	B

Note: For abbreviation, refer the foot-note mentioned in the proforma of the Design.

LIST OF INSTRUCTIONAL OBJECTIVES OF SCIENCE1.0 KNOWLEDGE

The pupil ACQUIRES KNOWLEDGE of technical terms, facts, procedures, processes, concepts, principles and themes.
Expected Learning Outcomes (SPECIFICATION).

The pupil

- 1.1 recalls Scientific facts, concepts, principles etc.
- 1.2 recognises Scientific apparatus, specimens, facts, etc.

2.0 UNDERSTANDING

The pupil DEVELOPS UNDERSTANDING of terms, facts, concepts, principles, etc. related to science.

Expected Learning Outcomes (SPECIFICATIONS):

The pupil

- 2.1 translates Scientific terms, symbols, formulae, data, etc. from one form to another.
- 2.2 cites illustrations of scientific principles, concepts, phenomena, etc.
- 2.3 identified relationship between various concepts, processes, etc., related to science.
- 2.4 detects errors in experiments, processes, statements, etc. related to science.

2.5 compares scientific terms, concepts, principles, etc.

2.6 classifies specimens, facts, concepts, etc.

2.7 interprets concepts, data, graphs, etc.

2.8 explains concepts, Principles, processes, etc.

3.0 APPLICATION

The pupil APPLIES knowledge and understanding of science in unfamiliar situations.

Expected Learning Outcomes (SPECIFICATIONS) :

The pupil

3.1 analyses the given data or observed scientific facts and phenomena to identify different components.

3.2 formulates hypotheses on the basis of given data or observed facts and phenomena.

3.3 suggests appropriate and alternative experimental procedures, for a given purpose.

3.4 gives reason for certain causes and effects in scientific phenomena.

3.5 draws conclusions from the given data.

3.6 generalises on the basis of his observations or given data

3.7 Predicts scientific phenomena from the observed facts or given data.

3.8 judges the relevance, adequacy and consistency of scientific concepts and principles in the given data, experimental procedures and other scientific phenomena.

4.0 SKILLS

The pupil develops SKILL in

- 4.10 drawing diagrams, charts, graphs, sketches, etc.
pertaining to science.
- 4.20 manipulation apparatus and instruments.
- 4.30 collecting, mounting and preserving specimens.
- 4.40 observing scientific specimens, phenomena,
structures, etc.
- 4.50 reporting information, evidence and results,
using scientific terminology.

Expected Learning Outcomes (SPECIFICATIONS) :

4.10 DRAWING SKILLS .

The pupil

- 4.11 draws diagrams, charts, etc. of observed or given
specimens, material, apparatus and instruments faithfully.
- 4.12 completes the incomplete diagrams correctly.
- 4.13 recognises the various structures in the sketches
and diagrams concerned with various functions.
- 4.14 labels sketches and diagrams methodically and
correctly.
- 4.15 draws sketches and diagrams neatly at a reasonable
speed.

4.20 MANIPULATIVE SKILLS :

The pupil

- 4.21 arranges the apparatus systematically.
- 4.22 handles the apparatus and instruments carefully.
- 4.23 reads the instruments and apparatus with precision.
- 4.24 maintains the apparatus and instruments in order.
- 4.25 improvises apparatus and models, using locally available materials.

4.30 COLLECTING, MOUNTING AND PRESERVING SKILLS.

The pupil

- 4.31 locates the right habitat of location for a particular specimen, material, etc.
- 4.32 gathers the required material during the appropriate seasons economically and purposively with permission of his/her teacher.
- 4.33 handles efficiently the equipment and instrument for collection of specimens, materials, etc.
- 4.34 uses the appropriate materials economically to mount the specimens.
- 4.35 selects the right preservatives for different specimens.

4.40 OBSERVING SKILLS :

The pupil

- 4.41 notices the relevant details in the given specimens and scientific phenomena carefully.
- 4.42 reads the apparatus and instruments correctly.
- 4.43 discriminates between closely related structures, parts and specimens accurately.
- 4.44 locates the desired parts in a dissection or specimen exactly.
- 4.45 detects errors in experimental set-up and procedures.

4.50 REPORTING SKILLS :

The pupil

- 4.51 selects the appropriate scientific terminology in describing specimens and phenomena.
- 4.52 uses the appropriate terms in proper sequence and right context.
- 4.53 puts the ideas in clear, precise and unambiguous form.
- 4.54 records the evidence or data from various sources faithfully.
- 4.55 tabulates the data or evidence in appropriate form.
- 4.56 presents the scientific information in a logical order.
- 4.57 summarises the data and evidences in accordance with the desired pattern.

5.0 APPRECIATION

The pupil APPRECIATES the scientific phenomena in nature and the role of science in human welfare.

Expected Learning Outcomes (SPECIFICATIONS):

The pupil

- 5.1 recognises the unity of life in diversity of forms.
- 5.2 signifies the interrelationships among various types of organisms.
- 5.3 develops insight into the means and methods of science used for exploiting nature and utilising natural resources for human welfare.
- 5.4 interprets the role of tools and techniques of science in the development of sciences.
- 5.5 realises the struggle for existence among living organisms and the role of adaptation for adjustment.
- 5.6 gets thrilled at the beauty of nature and is convinced of the role of biology in developing aesthetic sense in human beings.
- 5.7 feels the importance of science as inquiry in exploring the secrets of nature.
- 5.8 visualises the impact of science on social behaviours.

6.0 INTEREST

The pupil develops INTEREST in the living and material world.

Expected Learning Outcomes (SPECIFICATIONS):

The pupil

- 6.1 enjoys collecting, mounting, preserving and displaying specimens of scientific interest.
- 6.2 Participates voluntarily in science club activities.
- 6.3 frequently writes articles in school and other magazines related to science.
- 6.4 visits on his own the botanical gardens, zoos, museums, factories, dams, and other places of scientific interest.
- 6.5 undertakes hobbies such as improvisation of scientific models, gardening, and field-study in his spare time.
- 6.6 reads regularly the books and journals on the life and works of scientists with pleasure.

7.0 SCIENTIFIC ATTITUDE

The pupil develops SCIENTIFIC ATTITUDE towards natural and physical phenomena.

Expected Learning Outcomes (SPECIFICATIONS) :

The pupil

- 7.1 becomes inquisitive about the scientific phenomena.
 - 7.2 is open minded in accepting others' view-points.
 - 7.3 believes in cause and effect relationship.
 - 7.4 does not accept things without proof or justification.
 - 7.5 suspends judgement in the absence of adequate evidence.
 - 7.6 shows perseverance in undertaking scientific activities.
 - 7.7 manifests intellectual honesty in reporting results of experiments.
-

APPENDIX -DB I B L I O G R A P H Y

Agarwal, J.P., Technique of Item Writing:

Biological Science. Mimeographed Publication,
MESSEDF, N.C.E.R.T., New Delhi, 1984.

-----, Developing Unit Tests: Biological Science.
Mimeographed Publication, MESSEDF, N.C.E.R.T., 1985.

Ahmann, J.S. and M.D. Glock, Evaluating Pupil Growth :
Principles of Tests and Measurement, Allyn and
Bacon, Boston, 1967.

Block, H. and P. Broadfoot, Keeping Track of Teaching.
Koutledge, Kingant & Paul, 1982.

Bloom, B.S. and others, Taxonomy of Educational Objectives,
Handbook I, Cognitive Domain. David McKay Co.,

-----, H.J. Thomas. and M.George, Handbook on Formative
and Summative Evaluation of Student Learning. Mc
Graw Hill Book Co., New York, 1971.

Brown, F.G., Principles of Educational and Psychological
Testing. Rinehart and Winston, New York, 1976.

Cronbach, L.E., Measurement and Evaluation in Teaching.
Macmillan Publishing Co., Inc., 1976.

Ebel, R.L. Essentials of Educational Measurement and
Evaluation. Prentice-Hall, N.J., 1979.

Gronlund, N.E., Measurement and Evaluation in Teaching
(3rd ed.) Macmillan Publishing Co. Inc., New York, 1976.

Hedges, W.D., Testing and Evaluation for the Sciences in
Secondary Schools. Wadsworth, 1966.

- Hill, W.H., "How Examinations Influence Methods of study".
Rajasthan Board Journal of Education, January 1967,
3-9.
- Hudson, B., Assessment Techniques: An Introduction.
Methuen Educational Ltd., London, 1973.
- Julian, C.S. and L.D. Dioppins, Educational and Psychological
Measurement and Evaluation. Prentice- Hall of India
Pvt. Ltd., New Delhi, 1978.
- Karnel, L.J. and M.O. Karnel, Measurement and Evaluation in
the Schools (2nd Ed.). Macmillan, New York, 1977.
- Lahiry, D. (Eds.), Purn Chond and V.P. Goel, Science : A
Text Book for class VI. National Council of
Educational Research and Training, New Delhi, 1987.
- Lindquist, E.F. (Ed.), Educational Measurement American
Council of Education, Washington D.C., 1951.
- Macashen, M.M., Writing Behavioural Objectives : A New
Approach. Harper and Row, New York, 1971.
- Marshal, J.C., and L.W. Hales, Classroom Test Construction.
Addison-Wesley, Inc., Mass., 1971.
- Macintosh, H.G.(ed.), Techniques and Problems of Assessment :
A Practical Handbook for Teachers.
Edward Arnold, London, 1977.
- Natrajan, V., Towards Better Questions (Item Writers' Cook
Book). Association of Indian Universities, New Delhi,
1978.
- Noll, V.L., and others, Introduction to Educational
Measurement. Houghton Mifflin, Boston, 1979.
- Mehrens, W.A. and I.J. Lehmann, Measurement and Evaluation
in Education and Psychology. Holt, Rinehart & Winston,
New York, 1978.
- Pophan, W.J., Modern Educational Measurement. Prentice-Hall
New York, 1978.

Stannell, D. and D.E. Tracy, Testing and Measurement in the Classroom. Houghton Mifflin, Boston, 1975.

Science : A Textbook for Class VI, NCERT Publication, 1987.

Science : A Textbook for class VII, NCERT Publication, 1988.

Science : A Text book for class VIII (Part I & II), NCERT Publication, 1989.

Science : A Text book for class IX (Part I & II), N.C.E.R.T. Publication, 1988.

Science : A Text book for class X (Part I & II), N.C.E.R.T., Publication, 1989.

Singh, Pritam (Ed.) Evaluation at the Secondary Stage. National Council of Educational Research & Training, New Delhi, 1986.

Srivastava, H.S., Pritam Singh, and V.S. Anand, Reforming Examinations : Some Emerging Concepts. National Council of Educational Research & Training, New Delhi, 1978.

Stoker, H.W., and R.P. Kropp, "Measurement of Cognitive Processes". Journal of Educational Measurement, 1, 1964, 39-42.

Tenbrink, T.D., Evaluation : A Practical Guide for Teachers. Mc Graw-Hill, New York, 1974.

Tuckman, B.W., Measuring Educational Outcomes : Fundamentals of Testing. Harcourt Brace, San Francisco, 1975.

Worthen, B.R., and J.R. Sanders, Educational Evaluation Theory and Practices. Washington, 1973.

Yadav, M.S., and R.Govinda, Educational Evaluation : A Package of Auto-instructional Materials. Sahitya Mudranalaya, Ahmedabad, 1977.